REMARKS

The drawings were objected for failing to comply with 37 CFR 1.84(p)(5) for reasons states on page 2 of the Office Action. The specification has been amended, and replacement drawing sheets have been provided for Figs. 1-4, to overcome the objections. Regarding Fig. 1, this figure has not been changed, however the specification has been amended: (1) to correct a typographical error by replacing the numeral "26" with "126" shown in Fig. 1, and (2) to delete the numeral "162" for a "release lever" which is not shown in Fig. 1. Regarding Fig. 2, the numeral "204" has been added to Fig. 2 such that the replacement sheet for Fig. 2 now shows the reference numeral "204" designating the "Channel" that was shown in Fig. 2 originally filed. Regarding Fig. 4, the replacement sheet for Fig. 4 shows larger and more readable reference numbers. No new matter has been added.

Claim 35 was objected to due to certain informalities. Claim 35 has been amended as suggested by the Examiner to overcome the objection.

Claims 1-36 are pending in the above-referenced patent application. Claims 1, 2, 8-9, 14-17, 23-25, 28, 34 and 35 were rejected under 35 USC 102(b) as being anticipated by USPN 6,233,109 to Melbye. Claims 3, 4, 18, 19, 26 and 27 were rejected under 35 USC 103(a) as being unpatentable over Melbye in view of USPN 5,233,487 to Christensen et al ("Christensen"). Claims 10, 11, 30 and 31 were rejected under 35 USC 103(a) as being unpatentable over Melbye and Christensen and further in view of USPN 5,347,407 to Solhjell et al ("Solhjell"). Claims 5-7, 12, 13, 20-22, 29, 32, 33 and 36 were deemed allowable if rewritten in independent form including all of the limitations of base claims and any intervening claims. Applicant wishes to thank the Examiner for detailing the allowable claims.

The undersigned wishes to thank the Examiner for the telephone conversation of Nov. 23, 2004, in which the Examiner clarified that in rejection of Claim 2, the sentence referring to USPN 4,760,471 (Brush et al) was inserted on Page 4 of the Office Action by mistake, and so Applicant can ignore it in responding to the Office Action.

Rejection of Claims 1, 2, 8, 9, 14-17, 23-25, 28, 34 and 35 under 35 USC 102(b)

Rejection of Claims 1, 2, 8, 9, 14-17, 23-25, 28, 34 and 35 under 35 USC 102(b) as being anticipated by Melbye is respectfully traversed because Melbye does not disclose all of the claimed limitations.

Melbye and the present invention are fundamentally different. Melbye discloses a *read process* by mechanically wobbling a read head while reading data to improve read performance. Whereas, the present invention discloses a *write process* which includes dithering a read-back signal (not wobbling a read head) during the write process, for reliable data storage and recovery.

Specifically, Melbye is directed to a **data reading process**, wherein a transducer head reads a desired data track by creating lateral differential motion of the head assembly with respect to the longitudinally extending data tracks of a magnetic tape. The differential motion is either created by tracking irregularities between the head assembly and the magnetic tape or by dithering or wobbling the head assembly with respect to the magnetic tape. In operation, a controller selects one of the read data signals generated by the read heads to generate a read back signal. The read back signal is the read data signal from the at least one of the two read heads reading the desired data track. (Abstract).

By contrast, in one embodiment, the present invention provides a **data writing process** using dithering which causes multiple heads to essentially appear to perform the same way. During that write process: data is written to the media, then read back while dithering is performed by injecting noise into the read-back signal, the error rate of the read data is determined, the read error rate is compared to a selected target error rate, and the write process is repeated if the read error rate is greater than the target error rate. Whereby, the heads generate the same error rates across all heads in the tape drive. In one example, a target error rate is selected for one or more of the data storage devices. For each data storage device, a dither value is determined for each head in the data storage device. Wherein for each head, using the corresponding dither value for writing data, essentially provides said selected target error for all the heads.

Regarding Claim 1, Melbye does not disclose a write process in a storage device, comprising the steps of: "selecting a target error rate for recording data during the write process, for one or more of the data storage devices," as required by Claim 1. Further, Melbye does not disclose the steps of: "for each data storage device, determining a dither value for each head in the data storage device, wherein for each head, using the corresponding dither value for the write process essentially provides said selected target error for all the heads," as required by Claim 1.

According to Melbye, a write head of head assembly 12 writes data into data fields 30 of data blocks 26 of a desired data track 22. The write head of head assembly 12 also writes the address information and the ECC data into address identifier fields 28 and ECC fields 32, respectively (col. 3, lines 22-25). That is the end of the **write process** in Melbye, and end of any analogous art comparison with the claimed invention herein. Clearly, the write process in Melbye does not disclose the claimed limitations of a write by selecting a target error rate for recording data during the write process, for one or more of the data storage devices, and for each data storage device, determining a dither value for each head in the data storage device, wherein for each head, using the corresponding dither value for the write process essentially provides said selected target error for all the heads, as required by Claim 1.

After the aforementioned write process in Melbye, in a **read process**, the controller 14 mechanically wobbles the head assembly 12 with respect to magnetic tape 16 in a selected pattern, wherein three heads read data from the desired data track and generate three read back signals. The combiner 46 selects the desired read back signal from the three read back signals, based on an address field and ECC in the read back signal (col. 4, lines 15-34). By mechanically displacing/wobbling the head assembly 12, there is always at least one head reading back proper data of the desired data track (col. 4, lines 52-54). Combiner 46 ensures that the output read back signal for each data block 26 is from the desired data track by examining address field 28 of each data block. The address field 28 identifies data track 22 of which data block 26 is located. Combiner 46 compares the data track identification of data block 26 with the number of the desired data track. Combiner 46 also uses the ECC contained in ECC field 32 to help select the read data signal with the best integrity (col. 4, lines 55-62). Clearly, the read process in Melbye has nothing to with the write process as claimed herein.

In the passage in col. 3, lines 55-67 (relied on by the Examiner), Melbye simply states that shift registers 40, 42 and 44 in the controller 14 are connected to respective heads 34, 36 and 38, wherein those registers receive read signals read by respective heads. The combiner 46 outputs a read back signal by selecting a desired one read data signal from shift registers 40, 42, and 44. The desired read data signal is a data signal read from the desired data track and it has the strongest ECC integrity and the least amount of noise of the other data signals read from the desired data track. The desired read data signal will be provided by a head that is properly aligned with the desired data track (col. 3, lines 55-67).

Nothing in that passage discloses the claimed invention. As explained, Melbye wobbles the heads while reading data from a desired data track, and selects a read back signal with acceptable ECC, indicating the corresponding read head is properly aligned with the desired data track. Melbye does not disclose *selecting a target error rate* for *recording data* during the *write process*, for *one or more of the data storage devices*, as required by Claim 1. The ECC in Melbye is not a target error rate as claimed, rather, the ECC contains a correction code which corrects errors in the data read from data field 30 by the read heads (col. 3, lines 18-19). Further, Melbye does not disclose the steps of, for each data storage device, *determining a dither value* for *each hea*d in the data storage device, wherein for *each head*, using the *corresponding dither value* for the *write process* essentially *provides said selected target error for all the heads*, as required by Claim 1. For at least these reasons, rejection of Claim 1, and all claims dependent therefrom, should be withdrawn.

Regarding Claim 2, Melbye (col. 3, lines 11-16; col. 4, lines 5-14; relied on by the Examiner) does not disclose that the write process for each head includes the steps of writing data blocks to the media, and reading said data blocks back from the media while introducing dither into the read-back signal as a function of the dither value, as required by Claim 2. As discussed, in a write process Melbye only writes data to tape. After the write process, when it is later needed to access that data, in a read process, Melbye mechanically wobbles all three heads while reading data from a desired data track, and selects a read back signal from the three read back signals with acceptable ECC, indicating the corresponding read head is properly aligned

with the desired data track. By contrast, as claimed herein, the write process for each head includes writing data blocks to the media, and as part of the write process, reading said data blocks back from the media while introducing dither into the read-back signal as a function of the selected dither value. In Melbye, once read back signals are generated, no dithering is introduced into them, as claimed herein. However, in the claimed invention, the read head is not wobbled as in Melbye, rather the data head is used to read data, and one the read back signal is generated, dithering (e.g., electronic noise) is introduced into the read back signal.

Regarding Claim 8, Melbye does not disclose a write process for each head which includes writing data blocks with that head while reading the data blocks and introducing dither into the read signal in the head as a function of the determined dither value for the head. As discussed above, in col. 4, lines 5-14 and lines 36-62 (relied on by the Examiner), Melbye only discloses a write process where data is written to tape. After the write process is complete, when it is later needed to access that data, in a read process, Melbye mechanically wobbles all three heads while reading data from a desired data track, and selects a read back signal from the three read back signals with acceptable ECC, indicating the corresponding read head is properly aligned with the desired data track. By contrast, as claimed herein, the write process for each head includes writing data blocks to the media, and as part of the write process, reading said data blocks back from the media while introducing dither into the read-back signal as a function of the selected dither value. In Melbye, once read back signals are generated, no dithering is introduced into them, as claimed herein. However, in the claimed invention, the read head is not wobbled as in Melbye, rather the read head is used to read data, and once the read back signal is generated, dithering (e.g., electronic noise) is introduced into the read back signal.

Regarding Claim 9, Melbye (col. 4, lines 36-69, relied on by the Examiner), does not disclose that during a read process for each head comprises reading data with that head without dithering, as required by Claim 9. As discussed, the read process in Melbye is different from the read process in Claim 9. The Examiner's interpretation of Melbye for Claim 9 is incongruent with that for Claim 1.

Regarding Claim 15, as discussed, in col. 3, lines 60-67 (relied on by the Examiner), Melbye does not disclose *selecting a target error rate* for *recording data* during the *write process*, for *one or more of the data storage devices*, as required by Claim 1. The ECC in Melbye is not a target error rate as claimed, rather, the ECC contains a correction code which corrects errors in the data read from data field 30 by the read heads (col. 3, lines 18-19).

Further, Melbye does not disclose the steps of, for each data storage device, determining the amount by which to artificially degrade the read signal during the write process for each head in the data storage device to essentially provide said selected target error rate for all the heads, as required by Claim 15. As discussed, the write process claimed herein has nothing to do with the read process in Melbye. Further, Melbye is not degrading the read back signals, as claimed. Indeed, in col. 4, lines 5-14 (relied on by the Examiner), Melbye only mentions mechanically wobbling the heads while reading a track, and then selects a read signal among the three read signals with the best ECC, without in any way degrading any of the read back signals. Melbye simply selects on of three read back signals, without processing the read back signals to artificially degrade them, as claimed. The teachings of Melbye go against the claimed invention. For at least these reasons, rejection of Claim 15, and all claims dependent therefrom, should be withdrawn.

Claims 16 and 17 were rejected for the same reasons as rejection of Claims 1 and 2. Rejection of Claims 16 and 17 is respectfully traversed for at least the reasons provided in relation to Claims 1 and 2 above.

Claims 23-25 were rejected for the same reasons as rejection of Claims 1, 2 and 9. Rejection of Claims 23-25 is respectfully traversed for at least the reasons provided in relation to Claims 1, 2 and 9 above.

Claim 28 was rejected for the same reasons as rejection of Claim 9. Rejection of Claim 9 is respectfully traversed for at least the reasons provided in relation to Claim 9 above.

Claim 35 was rejected for the same reasons as rejection of Claim 1. Rejection of Claim 35 is respectfully traversed for at least the reasons provided in relation to Claim 1 above.

Rejection of Claims 3, 4, 18, 19, 26 and 27 under 35 USC 103(a)

Rejection of Claims 3, 4, 18, 19, 26 and 27 under 35 USC 103(a) as being unpatentable over Melbye in view of Christensen is respectfully traversed because the references, alone or in combination, do not disclose all of the claimed limitations.

Regarding Claim 3, as the Examiner also states, Melbye does not disclose a write process for each head including the steps of: determining the error rate of the read data, comparing the read error rate to the target error rate, and repeating the write process if the read error rate is greater than the target error rate, as required by Claim 3. However, the Examiner interprets Christensen (abstract and col. 6, lines 40-52) to disclose such limitations. Rather, unlike the write process of the claimed invention, Christensen (Abstract and col. 6, lines 40-52) only describes a read process in a rotating media storage system which measures the error rate of the written data as a function of the read offset of a detector (read head) on a track. Christensen counts the number of errors detected in reading written data for various read offsets when the data storage system is initially activated. When the number of errors reaches a target rate, the read offset required to produce the target rate is saved. This procedure is performed on either side of a data track. The read head is then centered between the two offsets. During the operation of the storage system, as thermal and mechanical errors are introduced into the head position compensation means, Christensen compensates by periodically determining a new offset for each side of the data track. The new offset which corresponds to the target error rate is between measured offsets for error rates which are higher and lower respectively than the target error rate. The read head is then recentered with respect to the write transducer position between the new offsets on either side of the data track.

There is no mention in Christensen of determining the error rate of the read data, comparing the read error rate to the target error rate, and repeating the write process if the read error rate is greater than the target error rate, as claimed. Christensen does not disclose a write process to increase read process performance, as claimed. Christensen does not disclose

repeating a write operation. Christensen does not disclose writing data, reading back the data, determining the error rate of the read data, comparing the read error rate to the target error rate, and repeating the write process if the read error rate is greater than the target error rate.

Further, the Patent Office recognizes the advantages of the presently claimed invention by trying to make modifications in the references to achieve the present invention. It is well settled that in order for a modification or combination of the prior art to be valid, the prior art itself must suggest the modification or combination, "... invention cannot be found obvious unless there was some **explicit** teaching or suggestion in the art to motivate one of ordinary skill to combine elements so as to create the same invention." *Winner International Royalty Corp. v. Wang*, No. 96-2107, 48 USPQ.2d 1139, 1140 (D.C.D.C. 1998) (emphasis added). "The prior art **must provide** one of ordinary skill in the art the **motivation** to make the proposed molecular modifications needed to arrive at the claimed compound." *In re Jones*, 958 F.2d 347, 21 USPQ.2d 1941, 1944 (Fed. Cir. 1992) (emphasis added). Neither reference suggests the motivation to modify or combine them as proposed by the Examiner. The references are individually complete and functionally independent for their limited specific purposes and there would be no reason to make the modification proposed by the Examiner. Therefore, because neither of the prior art references suggests the combination and modifications proposed by the Examiner the combination and modifications are improper.

The Examiner does not describe how combining the references results in the claimed invention. Modifying Melbye to include Christensen's read offset compensation provides a non-functioning system because in reading data, Melbye mechanically wobbles the read heads, whereas Christensen in reading data, attempts to negate head wobbling and offset due to mechanical and thermal effects. Melbye and Christensen are incompatible, and one of ordinary skill in the art would not even attempt to combine them. The references are concerned with a read process, whereas the claimed invention is concerned with a write process. For at least these reasons, rejection of Claim 3 should be withdrawn.

Regarding Claim 4, for reasons discussed above, Melbye (col. 3, lines 11-16; col. 4, lines 5-14; col. 3, lines 60-67; col. 3, line 60 to col. 4, line 14; col. 4, lines 36-62; relied on by the

Examiner) does not disclose a write process comprising determining a dither value for each head which includes the steps of, for each head: writing data blocks on a recording media, and reading said data blocks from the media while introducing dither into the read signal as a function of different dither values; measuring the error rate generated for each dither value; and based on the measured error rates, determining a dither value which generates an error rate at essentially the target error rate for that head.

Claims 18 and 19 were rejected for the same reasons as rejection of Claims 3 and 4. Rejection of Claims 18 and 19 is respectfully traversed for at least the reasons provided in relation to Claims 3 and 4 above.

Claims 26 and 27 were rejected for the same reasons as rejection of Claims 3 and 4. Rejection of Claims 26 and 27 is respectfully traversed for at least the reasons provided in relation to Claims 3 and 4 above.

Rejection of Claims 10, 11, 30 and 31 under 35 USC 103(a)

Rejection of Claims 10, 11, 30 and 31 under 35 USC 103(a) as being unpatentable over Melbye and Christensen and further in view of Solhjell, is respectfully traversed because the references, alone or in combination, do not disclose all of the claimed limitations.

Regarding Claim 10, Melbye and Christensen, alone or in combination, do not disclose all of the claimed limitations. Further, Melbye, Christensen and Solhjell, alone or in combination, do not disclose a write process for each head, including writing data blocks with that head while reading the data blocks and introducing dither into the read signal in the head as a function of the determined dither value for the head, wherein upon detecting a block error while writing a data block on a section of the media, that data block is re-written. As discussed, Melbye and Christensen, alone or in combination, do not disclose a write process for each head, including writing data blocks with that head while reading the data blocks and introducing dither into the read signal in the head as a function of the determined dither value for the head. Further, there is no mention in Melbye or Christensen of repeating a write operation.

Solhjell is directed to a method and system that detect and remove particles from a tape. Solhjell has nothing to do with the claimed invention, and does not disclose a write process as claimed using dithering of the read back signal as a function of the determined dither value for the head, wherein upon detecting a block error while writing a data block on a section of the media, that data block is re-written. Further, there is no mention or suggestion in the references to combine them. The Examiner does not describe how combining the references results in the claimed invention. Modifying Melbye to include Christensen's read offset compensation provides a non-functioning system because in reading data Melbye mechanically wobbles the read heads, whereas Christensen in reading data, attempts to negate head wobbling and offset due to mechanical and thermal effects. Melbye and Christensen are incompatible, and one of ordinary skill in the art would not even attempt to combine them. Further, modifying Melbye and Christensen to include Solhjell does not yield a functioning system and does not teach the claimed invention. The references are incompatible, and one of ordinary skill in the art would not even attempt to combine them.

Further, the Patent Office recognizes the advantages of the presently claimed invention by trying to make modifications in the references to achieve the present invention. It is well settled that in order for a modification or combination of the prior art to be valid, the prior art itself must suggest the modification or combination, "... invention cannot be found obvious unless there was some **explicit** teaching or suggestion in the art to motivate one of ordinary skill to combine elements so as to create the same invention." *Winner International Royalty Corp. v. Wang*, No. 96-2107, 48 USPQ.2d 1139, 1140 (D.C.D.C. 1998) (emphasis added). "The prior art **must provide** one of ordinary skill in the art the **motivation** to make the proposed molecular modifications needed to arrive at the claimed compound." *In re Jones*, 958 F.2d 347, 21 USPQ.2d 1941, 1944 (Fed. Cir. 1992) (emphasis added). Neither reference suggests the motivation to modify or combine them as proposed by the Examiner. The references are individually complete and functionally independent for their limited specific purposes and there would be no reason to make the modification proposed by the Examiner. Therefore, because neither of the prior art references suggests the combination and modifications proposed by the Examiner the combination and modifications are improper. For at least these reasons, rejection

of Claims 10 should be withdrawn. Further, rejection of Claim 11 should be withdrawn for at least the reasons provided in relation to Claim 10.

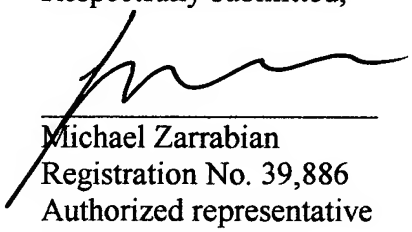
Claims 30 and 31 were rejected for the same reasons as rejection of Claim 10 and 11. It is respectfully submitted that rejection of Claim 30 and 31 should be withdrawn for at least the reasons provided in relation to Claims 10 and 11.

Conclusion

Applicant believes that the application appears to be in form for allowance. Accordingly, reconsideration and allowance thereof is respectfully requested.

Please address all future correspondence to agent of record.

Respectfully submitted,



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